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# Uncovering Challenges and Opportunities of Including Children with Visual Impairments in Mainstream Schools

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**We report on a field study aimed at understanding the challenges facing inclusive education practices for children with visual impairments (VIs). We interviewed 25 practitioners and observed seven teaching sessions at three support services and mainstream schools that include children with VIs. A thematic analysis of the data highlighted the need to develop incidental learning opportunities; to break the phenomenon of the “teaching assistant bubble”; and to support a maker culture prominent amongst practitioners. Our findings offer insights into areas where technology-enhanced learning tools could be introduced to address the challenges of including children with VIs in mainstream schools.**

*Inclusion, Education, Visual Impairments, Qualitative Methods, Assistive Technology*

## 1. INTRODUCTION

There are over 25,000 children with visual impairments in the UK (ONS 2015) and approximately 70% are educated in mainstream schools, which often takes the form of one or two learners in a class of up to thirty sighted peers (Morris and Smith 2008). While policies for the inclusion of children with VIs have been in place for a number of years (DEE 1997), in practice, recent studies revealed that the participation of children with special educational needs (SEN) in inclusive classrooms is still not optimal and that sound knowledge on effective practices in this domain is lacking (Gray 2009; Scruggs et al. 2011; Vivanti et al. 2017). It is therefore timely to examine how technology can contribute to improving the inclusion of children with VIs in the mainstream education system. As a first step, we present in this paper an examination of inclusive practices in mainstream schools via interviews with practitioners and observations of teachings sessions with the aim of understanding the challenged and opportunities for supporting the inclusion of visually impaired and blind children in mainstream schools.

## 2. BACKGROUND

Inclusion concerns the practice of providing a learning friendly environment for all or most children that allows them to experience and embrace diversity

and participate fully, and to schools employing teaching approaches that enable this (Skjørten 2001). In this respect, school support services are crucial in ensuring the recognition and appropriate responses to the needs of all learners and providing continuous competent advice (Ainscow et al. 2006). To be effective, inclusive practices have been grounded in both legal and policy decisions throughout their relatively short history, but it is important not to overlook the challenges associated with practical provisions on the ground. Students identified as having SENs are often reported to experience difficulties in participating fully in regular education (Bossart et al. 2013). Research from 68 surveys of teacher attitude toward inclusion between 1958 and 2011, which included 18,926 respondents from the US indicated that while a majority supported the general idea of inclusion, only a minority supported full time inclusion (Scruggs et al. 2011). Similar results were reported in the UK and Northern Ireland (Gray 2009). Teachers across a number of countries do not always report having the training, time and resources available for the implementation of inclusion. In practice, typical devices and software used to support students with VIs in schools include text-to-speech devices, screen readers, and computer screen enlargement software (McDonald et al. 2014). The role of assistive technology (AT) in improving not only the education but the lives of students with disabilities

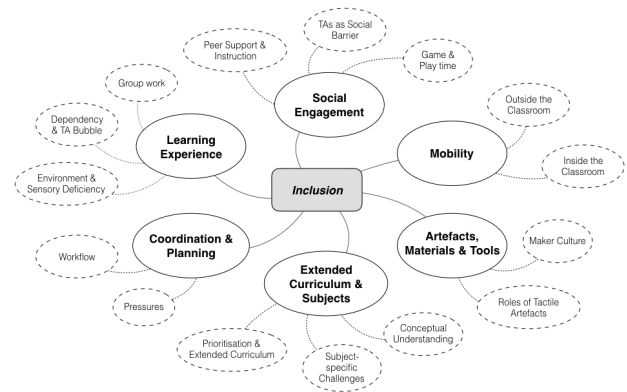
has been thoroughly demonstrated (e.g. Hersh and Johnson (2008)), yet teachers of students with disabilities consider their knowledge of AT to be inadequate and their use in educational setting continues to be limited (Lee and Vega 2005; Bouck 2016). Thus, in seeking to design novel educational ATs, it is important to consider the barriers and challenges for their uptake by practitioners and learners. In general, studies concerning the inclusion of children with disabilities in mainstream settings have focused on questionnaires and surveys of teachers' attitudes towards the general concept of inclusion rather than actual classroom experiences (e.g. De Boer et al. (2011)), with fewer studies having used interviews or observations to elaborate or contextualise findings. The present study contributes to this body of work in terms of method and target practitioners, combining in-depth interviews with in-class observations to characterise the challenges and opportunities related to the provision of inclusive mainstream education for children with VIs.

### 3. STUDY

We partnered with SEN Support Services and mainstream schools from three counties in the UK. SEN services employ qualified teachers of visual impairments (QTVIs) who work closely with SEN coordinators (SENCOs), teachers, and teaching assistants (TAs) in schools. The services we engaged with work across 14 boroughs with approximately 600 children who have sensory impairments. Three schools were selected to provide access to children with a wide range of VIs, ages and abilities. In total, 25 practitioners across three sites took part in the study; nine QTVIs, three SENCOs, seven TAs and six teachers with experience ranging from eight to 20 years in their corresponding practice. Each QTVI works with 20 to 30 children, and each TA works with up to two children with VIs.

#### 3.1. Procedure

We used semi-structured interviews (Seidman 2013) around perceptions of inclusion in practice, provisions in terms of structures and resources, and difficulties and challenges faced by children and practitioners. Interviews with schools' staff took place on corresponding schools' premises at a time convenient to the interviewees, and with QTVIs at their work site, lasting one to two hours. We observed seven teaching sessions spanning English, mathematics, design technology (Key Stage 1, Year 2, 7-8 years old), and history (KS2, Year 4, 9 years old), and business, science and computer science (KS3, Year 9, 12-14 years old, and KS4, Year 10, 16 years old). Whenever possible, observations were followed by informal discussions with the teachers



**Figure 1:** Thematic map of areas of challenge and opportunity for technological support for inclusion.

and the children (in presence of a staff or a parent), which lasted between 15 and 30 minutes. Consent forms were obtained from all participants and, in the case of the children, from their parents. Children also gave verbal assent at the onset of the observations. The age of the children we observed (two female, four male) ranged from seven to 16 years old (median = 12), two have a visual impairment, one has degenerative sight, and three are totally blind.

#### 3.2. Data collection and Analysis

Interviews were tape recorded and transcribed verbatim. We used a thematic analysis (Braun and Clarke 2006) following a grounded approach, which enabled us to build themes up as we went through the collected data. Two researchers iteratively identified codes and themes that emerged across five interview transcripts, which were then refined and used by one researcher to code the remaining transcripts. Observation videos were also coded using these themes by the same researcher.

### 4. RESULTS

284 conceptual labels were derived from the data. A category code list was agreed upon through iterative discussions amongst two researchers to produce the final coding schemes, resulting in 15 initial categories, which were refined into six main themes: *Learning Experience*, *Social Engagement*, *Artefacts, Materials & Tools*, *Coordination & Planning*, *Extended Curriculum & Subjects*, *Mobility*. There were also sub-themes associated with each main theme as shown in Figure 1. We only report on a portion of the data in the following, providing an outline of the first three themes with indicative quotes from the raw data <sup>1</sup>.

<sup>1</sup>Participants wished to be anonymised, we therefore refer to them in the text as: support staff=QTVI#; special education needs coordinators=SENCO#; Teaching Assistants=TA#; Teachers=TC#

## 4.1. Learning Experience

All interviewees highlighted that the learning experiences of children with VIs will be different from their sighted peers: *"If you want to be included in society as an independent visually impaired adult, there has to be a good understanding that a lot of the journey that gets you there is probably not going to look like what people understand inclusion to be"* (QTVI9). However, they also raised a number of concerns regarding the impact of certain differences on the provision of inclusive education:

### 4.1.1. Environment

The classroom environment often needs to be arranged so that it accommodates the needs of a child with a VI. While these arrangements are typically driven by the physical and technical needs of the child, they could lead to social disconnection and exclusion from group dynamics if not carefully thought through: *"if the child always has to be in the corner where the socket is, and you don't want the child to be cornered all the time, the child might think I don't want to go there I want to be with my mates"* (QTVI1). Pedagogical measures were pointed out as offering both a potential solution and an additional barrier to social inclusion. For example, a TA discussed attempting to overcome an accessibility issue related to mobility within the environment pointed out that: *"they needed to get to the posters and the sheet stuck on the wall in each corner, I had an iPad with me, so I jus took the pictures, took it back to where [he] was sitting and just read it to him [...] but then you see he was not a full participant because of this arrangement"* (TA8). Differences in sensory experiences of children with VIs and sighted peers was also a salient topic in this sub-theme, and included the deficiency of sensory stimulation and the impact that this has on reducing opportunities for incidental learning:

**Incidental Learning** – Classrooms are typically dense with visual displays and artefacts related to ongoing learning activities. Figure 2 shows an example of this from a KS1 Year 2 class: *"think about the richness of resources that we use with sighted children these days, we have beautiful pictures, interactive whiteboards and displays around the classrooms, all these things that we think are necessary for the sighted children"* (TA9).

**Boredom** – This lack of stimulation can lead to disengagement and boredom during individual and group work and some TAs took it on themselves to provide alternatives, for example through pre- and post-tutoring: *"it's nice to talk to [him] about what we're going to be doing before it happens so he got a bit of background because all other children have the stimulation of displays on the wall and the interactive*



**Figure 2:** (Top) visual referencing during a lesson. (Bottom) examples of visual displays and decorations. Downwards arrows point to where the child with a VI sits.

*whiteboard"* (TA2). At other times, we observed TAs introducing additional sensory stimulation that was not directly relevant to the lesson, and when probed, they explained: *"sometimes if he is sat on the carpet it feels like a long time, I mean the children whether they're always focused on [the teacher], I don't know, but they've also got the stimulation of the whole room, [he] hasn't got that, so sometimes I give him a little fiddle toy, but sometimes that could be a little bit of a distraction"* (TA7). The child in question was surrounded by various visual artefacts (Figure 2).

### 4.1.2. Dependency: the TA Bubble

The *TA bubble*, or *lesson-within-a-lesson*, were reoccurring discussion points. All interviewees raised concerns about the close interactions between a child and their TA during lessons, which coupled with teachers reliance on TAs, often turns into a separate lesson with its own material, scope and pace, detached from the rest of the classroom: *"[the child] sits with the TA only, which is necessary at times, but can lead to isolation from the whole classroom"* (QTVI2); *"I'm the class teacher, I teach 29 other children and it's very difficult to engage all of the time, that's why we heavily rely on TAs"* (TC2); *"some teachers have him on a table separate with the TA that's supporting him, and he almost has a lesson within a lesson [...] I mean have him in a different room, it's almost the same sort of thing cause he is in his own little bubble"* (TA6) (Figure 3). We identified a number of factors that contribute to the formation of the "TA bubble", including: **1) Languages disconnects:** *"it starts with that, the teacher hasn't explained what's on the board, the TA then gets busy with 'he is pointing*





**Figure 3:** (Top) TA Bubble. (Bottom) Carpet Time

to this and that', then the pupil stops listening to the teacher even when the teacher is talking, they don't think the teacher is talking to them, they're actually conditioned not to listen" (QTVI9); **2) Spatial disconnects:** "a TA needs to talk to the pupil about what's going on, so teachers often then put them at the back of the class so they're not disturbing others" (QTVI5); and **3) Material disconnects:** "it is the TAs who have to adapt [the material] it would be wonderful if somehow that material was suitable for anybody" (SENCO3).

#### 4.1.3. Group Work

Interviewees discussed three forms of group activities; whole class, small group work, and working in pairs. We also observed all three forms of activities. The following challenges were raised with regards to group work across the three forms: **1) Pace:** How learning materials are accessed and recorded, e.g. through Braille, as well as the need for continuous exchange with TAs lead to difficulties with keeping up with group activities. Interviewees highlighted that this is exacerbated by the use of interactive whiteboards: "teaching is often very visual, with time that has gotten more so because they use interactive whiteboards and teachers are encouraged to keep the pace up otherwise you get into trouble" (SENCO1). **2) Ambiguous language:** Another element that contributes to exclusion from group work is the use of ambiguous and visual language both by teachers and peers. A child who is blind or with low vision comes to a situation with different model of the world (Noordzij et al. 2006; Stockman and Metatla 2008), but as more technology is used in the classrooms: "more and more of it relies on the teacher making a verbal input that assumes either a shared visual resource

or a shared previous visual experience and therefore the language used is an incomplete language" (QTVI5). **3) Joint attention and shared displays:** Ambiguous language is particularly exclusionary during joint activities and around shared displays. Issues around the use of whiteboards were indeed very salient in the data, and while there is technology that provides a form of access, such as replicating monitors, it did not seem enough to support joint attention in the cases we observed and the TAs often become proxies for children's contributions. **4) Technology as barrier:** Technology was highlighted as a potential barrier to group work in two ways. First, it can take too much space that would otherwise be used for group formations: "[he] often needs double the space to house all the various bits he uses they take the whole double desk and nobody can sit besides him" (TA3). This is exacerbated by the fact that such technology is not always designed to be used by or shared with sighted peers: "we could really use a refreshable Braille display, the one that also shows print so he can share it with a friend" (TA2). Second, when it malfunctions: "a lot of the braille technology we have crashes, they'd be in the middle of work and they would lose all their work" (QTVI6), thus hindering ongoing joint work.

## 4.2. Social Engagement

Interviewees emphasised the importance that children with VIs feel part of a social group as well as develop social skills that allow them to maintain their social engagements.

### 4.2.1. TAs as Social Barriers

But TAs find themselves in situations requiring balancing adult supervision with allowing the occurrence of healthy social interactions: "children in classrooms do an awful lot of looking out of the windows, kicking each other under the table, sniggering and giggling and all that, when the TA is there, they can't really be there as an adult and be seen to just ignore it" (TA9), this means that "non-curricular" social interaction and social learning is naturally reduced around the TA bubble.

### 4.2.2. Games

Discussions about games are a typical example of informal chats that go on amongst peers. Games were also brought up as a way for children with VIs to engage in mischievous behaviour: "it's something for blinds kids to be a little naughty as well, I caught [the child] playing an audio game while wearing headphones when he was supposed to be using the calculator!" (TA6). But this is not a shared experience with sighted peers because of the gap that exists between accessible games and typical games available to sighted children.

#### 4.2.3. Finding Friends in the Playground

Another prominent topic in this theme was difficulties with finding friends outside class: *“most schools have uniforms and there is 400 children running around all wearing navy blue, how do you find your friend?! that makes play time one of the hardest time of the school day actually”* (QTVI4). In one instance, a TA relayed a real ordeal for a child with a VI in secondary school who could no longer find their friend and assumed they had lost them: *“all of a sudden we realised that he was hitting quite a low patch and when we looked into it it was because he could no longer find his friend [...] what had actually happened was that his friend had a new rucksack and he was looking for the wrong colour”* (QTVI7).

### 4.3. Artefacts, Materials & Tools

#### 4.3.1. Maker Culture

It was clear from our interviews and observations that there is a prevalent maker culture amongst the practitioners involved in the provision of inclusive education for children with VIs: *“we’re always changing things, seeing what works and what doesn’t, and we just adapt, that’s part of our job really”* (TA2). The maker culture seems to be naturally nurtured by two reoccurring factors; first the difficulty of reusing materials and resources; second, by the heterogeneity of needs of children with VIs: *“adaptation of the material is very individual, for [the child], colour is very important, so I colour code the numbers so he can see them”* (TA1). Some TAs involve children in the making process as a strategy for empowering the child and promoting ownership of learning processes and artefacts.

#### 4.3.2. Roles of Tactile Artefacts

We could identify the following common roles that tactile artefacts played in these practices: **1) Access:** Accessing the curriculum is an obvious role that tactile artefacts play, but there were common issues with using them to access visual displays such as maps in terms of dealing complexity and clutter: *“We use tactile maps as much as we can but the problem is the other students are looking at a much richer map if you try to put all of that into tactile it ends up being just a mass of lines”* (QTVI3). **2) Stimulation:** Related to discussions of sensory deficiency, a number of interviewees highlighted that tactile artefacts are often added on not as vehicle for direct learning, but as a secondary means to increase interest in a learning activity. An example of this is helping children with VIs remember a sequence of a story. **3) Orientation and Navigation:** Children with VIs often have fixed locations within their class environments, which allow them to map out appropriate routes to navigate to and from them. There are tactile artefacts intentionally added onto the environment to assist their orientation and

navigation, e.g.: *“she has a carpet space, it’s a rubbery dot so when she comes to the carpet she has a feel for her rubbery dot and sits on it”* (TC1). **4) Sharing:** Tactile artefacts also play a role in supporting access to shared content by providing access to equivalent representations of teaching materials, such as tactile diagrams and maps, and through direct use of certain artefacts that afford multisensory interaction: *“numicons are used by everybody, if you can’t see the colour you can still feel them but it’s harder, you can also weigh them to know that 8 and 2 is the same as 3 and 7”* (SENCO2).

## 5. DISCUSSION

Provision of inclusive education in UK-based mainstream schools involves close coordination between teachers and support staff at a school (SENCOs and TAs), and support staff from the corresponding local authority (QTVIs). Close interactions between TAs and children with VIs are crucial to their learning in inclusive classrooms (Kemp and Carter 2002; Lee et al. 2010). But our analysis also showed that over reliance on the TAs, both on the part of teachers and the children, as well as the social stigma associated with the presence of an adult amongst peers, can lead to isolation and barriers to inclusion. There was consensus amongst all participants that, despite difficulties that may arise with such a move, a fuller inclusive experience should involve bursting the TA bubble. Addressing the factors that contribute to the formation of the TA bubble could therefore a promising development opportunity. This could be through the introduction of teaching environments that nudge teachers and peers towards avoiding deictic referencing to bridge language disconnects, or introducing more potential for shared experiences through multi-sensory common displays to bridge spatial and material disconnects.

We have also found that, compared to their sighted peers, the learning experiences of children with VIs often suffer from sensory stimulation deficiencies, whether this is due to inaccessible visual displays and decorations on walls and corridors, or to the use of visually-dense teaching methods such as interactive whiteboards. Indeed, TAs often resorted to introducing additional sensory stimulation to account for said deficiencies, desperately enough that at times non-relevant stimulation was introduced just to avoid boredom during group activities. Another promising avenue is therefore to focus on enriching the environment within and outside classrooms with non-visual ambient sensory displays that could promote joint attention and increase opportunities for incidental learning for all children. Indeed, examples

of technology that support sharing and joint work between children with VIs and their sighted peers were scarce in our data despite the availability of devices that could potentially support such activities, e.g. interactive whiteboards and tablet computers. We believe that this provides an opportunity for future work engaging practitioners to explore how other modalities can be exploited and combined in the provision of shared experiences between with different sensory abilities. There was also a prevalent maker culture amongst the support staff and practitioners we interviewed, particularly the TAs, that could be scaffolded by maker toolkits for rapid and adaptable tinkering to exploit the variety of materials and experiences already familiar to the TAs, children and teachers. This could therefore support activities that readily fit within current teaching and learning practices to avoid the issue of assistive technology uptake (Bouck 2016). Such toolkits could also be a means for engaging all children in the production of their own learning material and contribute to empowering all parties involved (Hurst and Tobias 2011).

Social engagement was another critical area in the development of more inclusive learning environments. There is a gap in accessible games that could be shared amongst sighted and visually impaired peers, and difficulties experienced in the playground, as well as side effects to the TAs presence that becomes a barrier to social interactions. An opportunity to overcome these challenges is therefore to introduce technology that improves and promotes the independence of children with VIs to seek and explore their own environment in pursuit of social encounters, for example to find their friends themselves in the playground and to explore additional physical and social spaces outside their regular routes.

## **6. CONCLUSION**

We reported on a qualitative study aimed at understanding challenges to inclusive teaching in mainstream schools as perceived by the practitioners involved in such provisions. Through a thematic analysis of in-depth interviews and observations, we highlighted how increasing technology in classrooms makes accessibility more challenging and considered where technology could more usefully support inclusion. Specifically, we drew out how technology could support coordination, burst the TA bubble, enable incidental learning, cater for multisensory shared learning experiences, and support independent social engagement and mobility. These findings offer insights into areas where technological intervention can be introduced to improve the inclusion of children with VIs in mainstream schools.

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